EMUFDD 4.30 – USB USER MANUAL

3.5", 5.25", 8" / FLAT-34PIN, FLAT-26PIN, SLIM-26PIN, USB, SCSI

The most reliable and configurable Universal Floppy HW Emulator

ALL-INCLUSIVE PROFESSIONAL INSTALLATION SERVICE AVAILABLE

Custom/non-standard floppies analysis & development available

USB Version

Network Version

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Section 10. SWITCHING CONFIGURATION
Section 11. SOFTWARELESS MODE ON/OFF

Appendix A. SUPPORTED FLOPPY DISK DRIVE INTERFACES

MILO S.N.C.
SW & HW per Automazione - Industrial Automation SW & HW
Via Ruggiero Grieco 1/C, 41011 Campogalliano (MO), Italy
Codice Fiscale / Fiscal Code: 03373570369 - P.IVA / VAT: 03373570369
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Section 1. DATASHEET

Retrofit services for the industry, from the machinery to the solution

EMUFDD Tech-Homepage :
www.embeddedsw.net

Designer & Customer Support :
embedded@embeddedsw.net

EMUFDD scores a unique 100% rate of successful floppy replacements:

- we freely help customers, **before purchasing**, in collecting all the needed infos;
- we provide **floppy analysis service** to identify/backup/emulate all floppy disks;
- we provide free software capable of doing **universal backup** of floppy disks;
- we provide free software capable of full **floppy drive virtualization**.

ALL-INCLUSIVE PROFESSIONAL INSTALLATION SERVICE AVAILABLE

We're able to come to you and directly retrofit all kind of existing industrial machinery, quickly, safely and at an affordable price:

- no need to change the CNC/PNC/control;
- no need to change any electronic;
- backup/digitalization/testing of all kind of data/program floppy disks;
- backup/digitalization/testing of all system/boot/recovery floppy disks;
- absolutely no need to rewrite programs;
- new programs saved directly on EMUFDD;
- shortest production stopping time;
- EMUFDD training of the worker.

DIMENSIONS	
HEIGHT [H]	1" = 2,5 cm
WIDTH [W]	4" = 10,2 cm
DEPTH [D]	5,3" = 13,5 cm
WEIGHT	300 g

HARDWARE	
INTERNAL MEMORY TYPE	1.5 MB **FRAM** non-volatile memory
INTERNAL MEMORY RELIABILITY	10^{14} R/W cycles = 438.000 h = 50 years 24/7
POWER ON TIME	Less than (<) 500 ms
USER FRONT INTERFACE	USB keys with FAT format – 100 floppy disks Ethernet 10T network – unlimited floppy disks
FLOPPY REAR INTERFACE	34 pin flat cable (3.5" & 5.25") + 5V power supply 26 pin flat cable (integrated power supply) 26 pin slim cable (integrated power supply) USB 1.0 standard external floppy SCSI 50 pin standard floppy
SOFTWARE	
FIRMWARE RELEASE	Revision 30 (March 2014)
CONFIGURATION	100% Jumperfree / Plug'n'Play
FIRMWARE UPGRADE SUPPORT	Yes
NETWORK SOFTWARE	WinXP, Win7, Win8, WinServer, x32 & x64

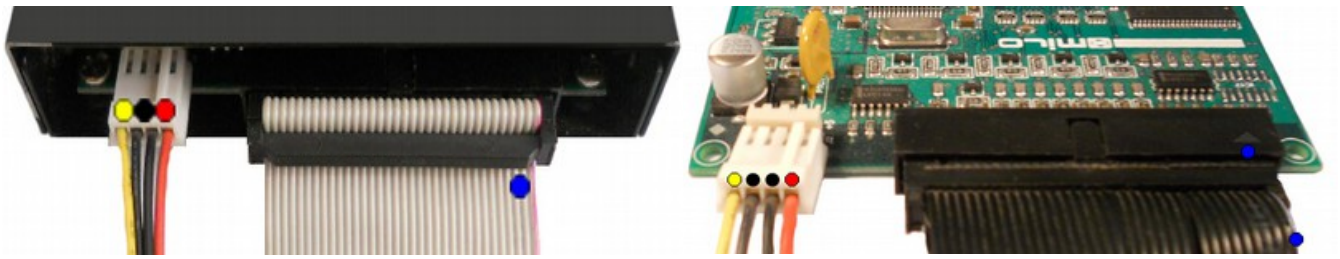
ENCODING	FM / MFM / ***custom on request***
SPEED	300 rpm / 360 rpm / ***custom on request***
DATA CLOCK	From 125 Khz (the old 8”) up to 500 Khz (the modern 3.5”)
SUPPORT	Softwareless Mode: FAT12 – 360KB / 720KB / 1.200MB / 1.440MB Raw Image Mode: ***Any existing standard or custom on request***
SOME COMMON EXAMPLES...	80/2/18x512 – MFM: 500 KHz – 300 rpm – 1.440MB 80/2/15x512 – MFM: 500 KHz – 360 rpm – 1.200MB 80/2/9x512 – MFM: 250 KHz – 300 rpm – 720KB 40/2/9x512 – MFM: 250 KHz – 300 rpm – 360KB
MORE LESS COMMON EXAMPLES...	83/2/18x512 – MFM: 500 KHz – 300 rpm – 1.494MB 80/2/32x256 – MFM: 500 KHz – 300 rpm – 1.280MB 80/2/5x1024 – MFM: 250 KHz – 300 rpm – 800KB 80/2/18x256 – MFM: 250 KHz – 300 rpm – 720KB 80/2/16x256 – MFM: 250 KHz – 300 rpm – 640KB
OLD & RARE EXAMPLES...	80/2/5x1024 – FM: 250 KHz – 300 rpm – 800KB 80/2/18x256 – FM: 250 KHz – 300 rpm – 720KB 80/2/32x128 – FM: 250 KHz – 300 rpm – 640KB 80/2/16x128 – FM: 125 KHz – 300 rpm – 320KB
NEED MORE?	***Ask customer support for help in identifying your floppy disk!***

"*Is EMUFDD compatible with my machinery*?"
"**Yes**, because EMUFDD it's the best existing professional emulation product, not just another off-the-shelf/junk/chinese one. We will:

- provide you extensive pre-selling support and specifically analyze your target;
- configure a 100% custom EMUFDD solution, just for you;
- help you remotely during the installation, using live Skype connection."

Gallery of custom EMUFDD installations worldwide

Section 2. HARDWARE INSTALLATION



EMUFDD installation works like any other real floppy drive installation:

- 2.1) connect the power supply;

🟡	=	+12V power supply (not connected)	**Optional**
⚫	=	two GND lines (joined, connect one or both)	**Required**
🔴	=	+5V power supply	**Required**

- 2.2) connect the 34pin flat cable.

🔵	=	pin-1 mark (flat cable / connector)

No system driver or additional software needs to be installed on the host system.

⚠ **Be sure to match the connector pin-1 mark with the flat cable pin–1 mark !**

⚠ **Sometimes flat cables are inverted. Please check whether the cable is coloured/marked at pin-1 (standard) or pin-34 (inverted) !**

Section 3. INTRODUCTION & EMULATION CYCLE

EMUFDD is equipped with 1.5 MB of internal **FRAM** non-volatile memory:

- **no need** to keep the USB key plugged in;
- top-quality data storage and memory **reliability** (10^{14} read/write cycles);
- **unlimited** permanent internal memory (no battery, fully RoHS).

More than 50 years of non-stop read/write emulation at full speed.

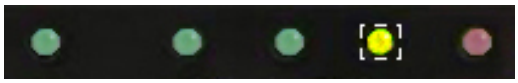
Each EMUFDD can be used by different users with different skills:

- **normal** users can be allowed to load-only floppy disks (playback);
- **advanced** users can have full access to the program floppy disks;
- special floppy disks can be **permanently** write protected;
- **simplified** access available: 1 USB key = 1 floppy disk.

Just ask for your version, fully customized for your everyday's usage !

At power-on EMUFDD immediately (less than 500ms) begins its emulation cycle:

- the emulation engine waits for reading or writing requests from the host system, and any read/write floppy disk access will turn the ACT_LED on;

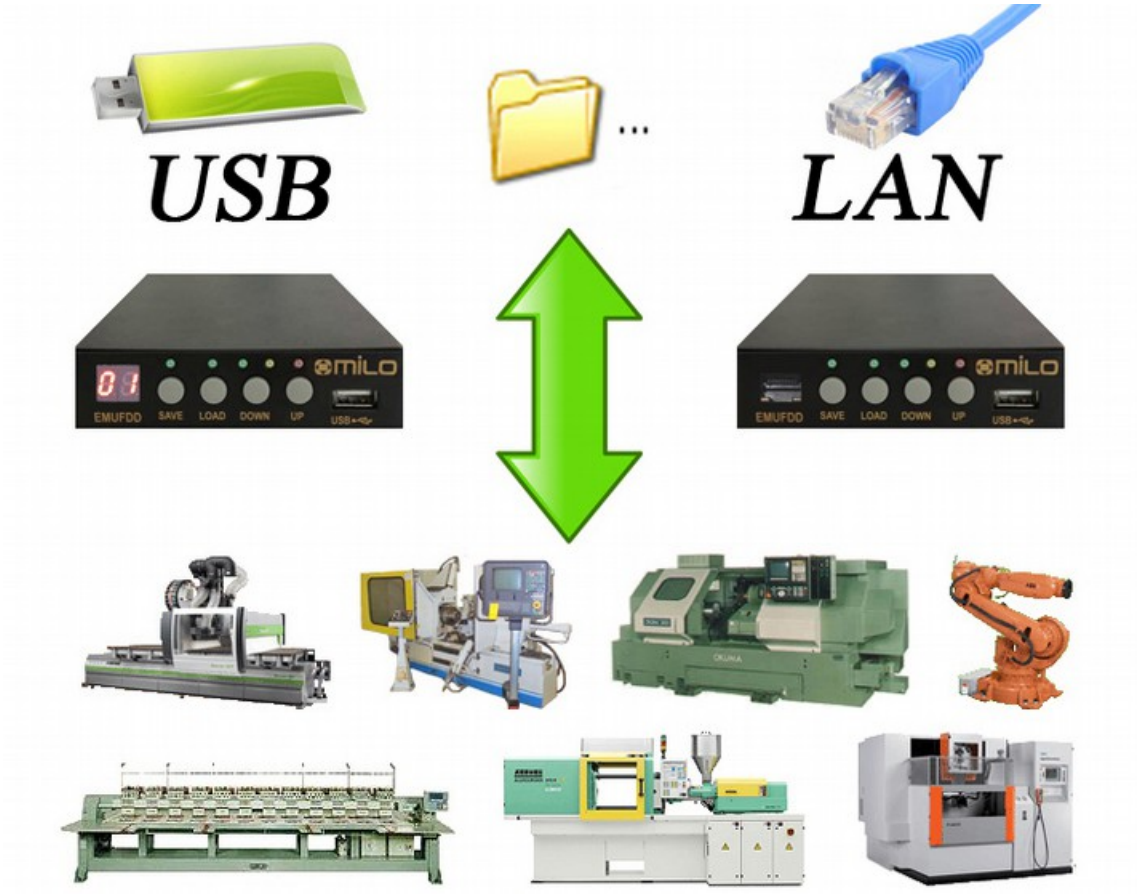


- the display continuously shows the On-Line sequence: **[–]** / **[–]** / **[NN]**, where NN is the current floppy disk number, (from **00** to **99**).

Snapshot of a display On-Line sequence (*NN = 01*).

Section 4. SOFTWARELESS MODE STORAGE

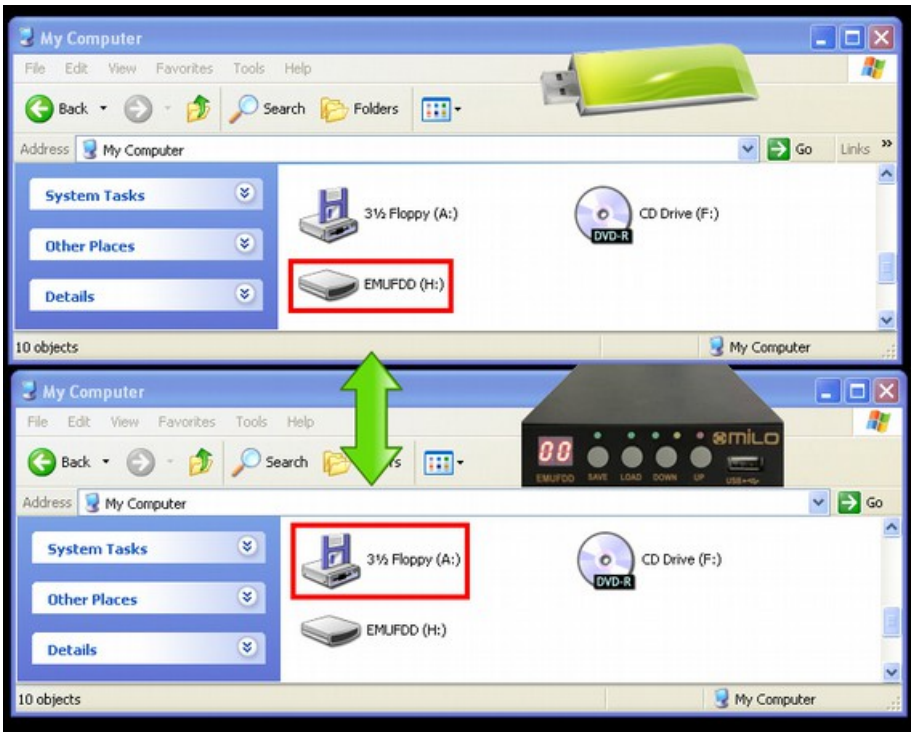
Data can be loaded/saved into/from EMUFDD's memory using any USB key. No special software or partitioning is needed to access and copy'n'paste all the floppy disks. The softwareless mode, a.k.a. "**Translation**", splits all the floppy disks into subdirectories and each "**emufddNN**" subdirectory (**NN** from **00** to **99**) will be handled as the root of a different floppy disk:



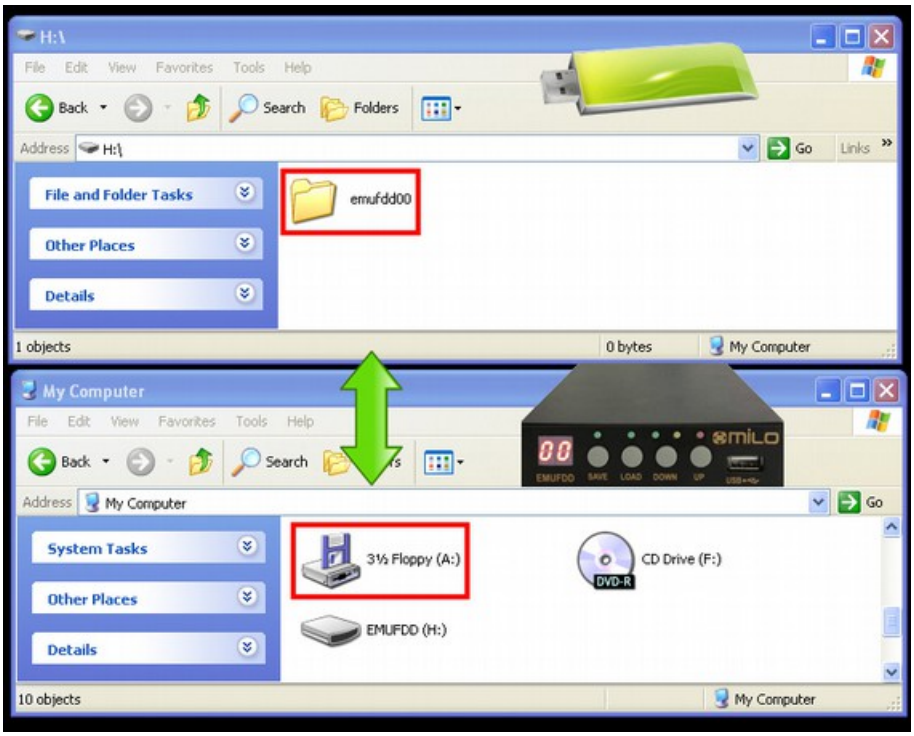
USB key	↔	**EMUFDD (floppy NN)**
X:\emufddNN\dir1\file1.ext	↔	A:\dir1\file1.ext
X:\emufddNN\dir2\file2.ext	↔	A:\dir2\file2.ext
X:\emufddNN\file3.ext	↔	A:\file3.ext
X:\emufddNN\file4.ext	↔	A:\file4.ext
...		...

The translation feature:

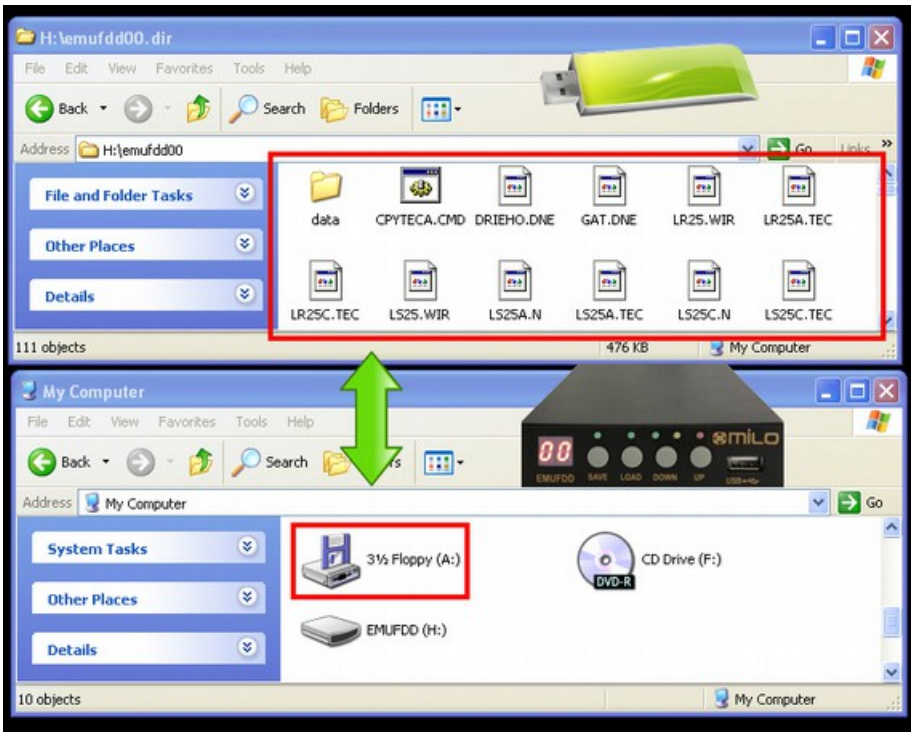
- is available for 360 KB, 720 KB, 1.200 MB, 1.440 MB floppy disks;
- is available for both loading and saving;
- will truncate filenames to 8+3 short form (Longname.ext → longna~1.ext);
- can be enabled/disabled at anytime without reconfiguring (SECTION 11).



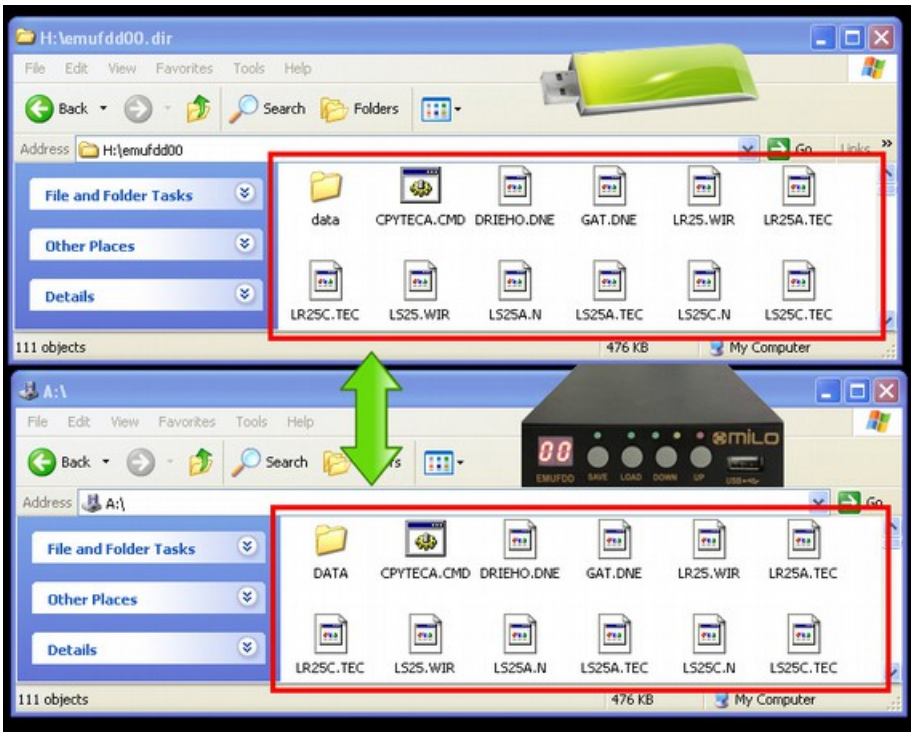
[*top window*] USB key (H:) in the PC server
[*bottom window*] EMUFDD (A:) in the machinery



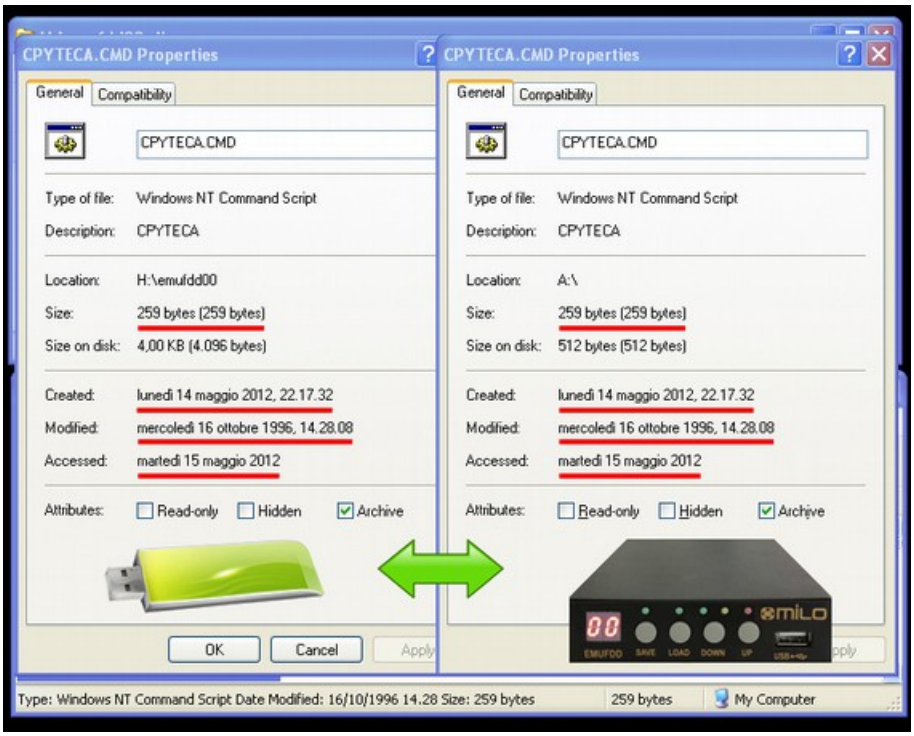
[*top window*] USB key (H:) in the PC server
[*bottom window*] EMUFDD (A:) in the machinery



[*top window*] USB key (H:) in the PC server
[*bottom window*] EMUFDD (A:) in the machinery



[*top window*] USB key (H:) in the PC server
[*bottom window*] EMUFDD (A:) in the machinery



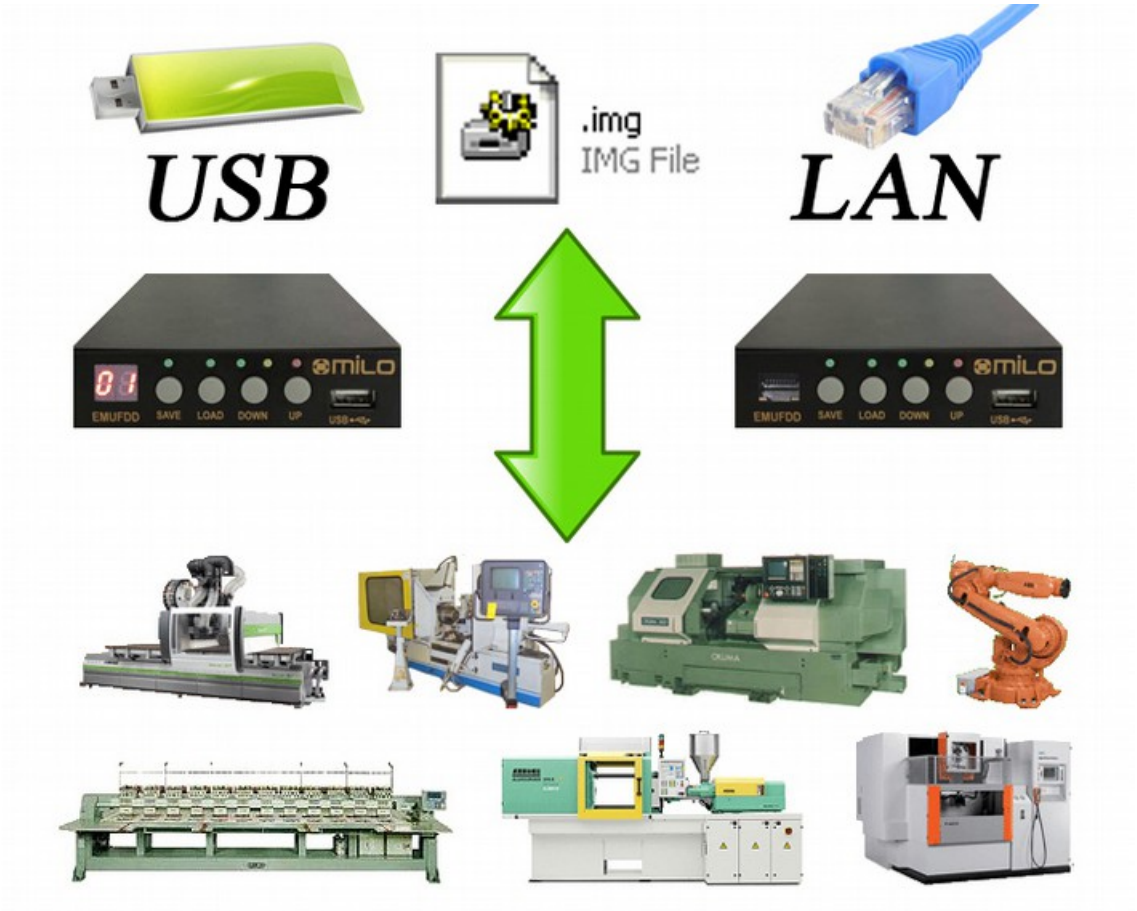
[*top window*] USB key (H:) in the PC server
[*bottom window*] EMUFDD (A:) in the machinery

A diff between the original **disk#00** in the USB key (H:\emufdd00\cpyteca.cmd) and its "translated" version by EMUFDD (A:\cpyteca.cmd) shows that there's no high-level difference in the directory structure and the attributes of each file:

Name / **Size** / **Creation time** / **Modify time** / **Access time**

Section 5. VIRTUAL-FLOPPY MODE STORAGE

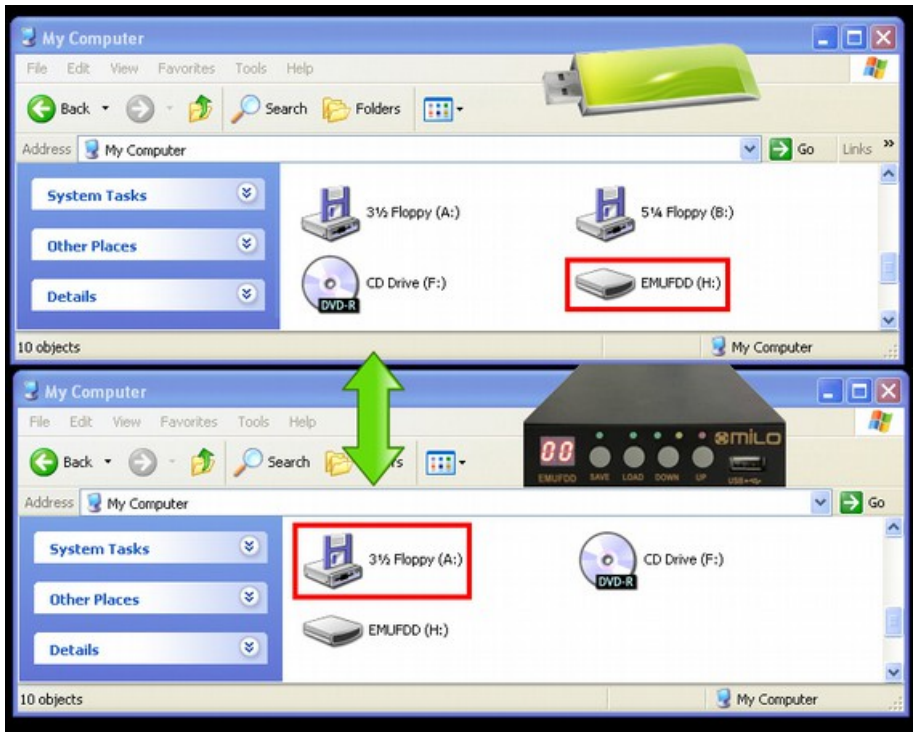
Data can be loaded/saved into/from EMUFDD's memory using any USB key. No special software or partitioning is needed to copy'n'paste all the floppy disks. The virtual-floppy mode, a.k.a. "**ISO FLOPPY IMAGE FILES**", splits all the floppy disks into image files (mounted on any PC using free software VFD) and each "**emufddNN.img**" file (**NN** from **00** to **99**) will be handled as the low-level snapshot of a different floppy disk:



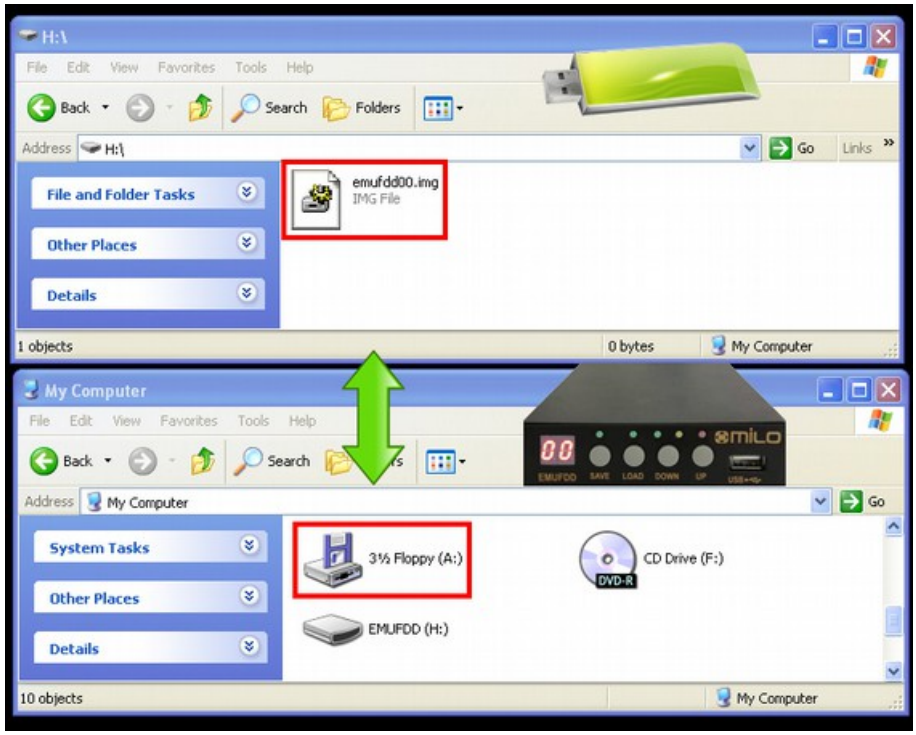
USB key	↔	**EMUFDD (floppy NN)**
X:\emufddNN.img	↔	<floppy> track0/side0/sector1
	↔	<floppy> track0/side0/sector2
		...

Virtual-Floppy image files:

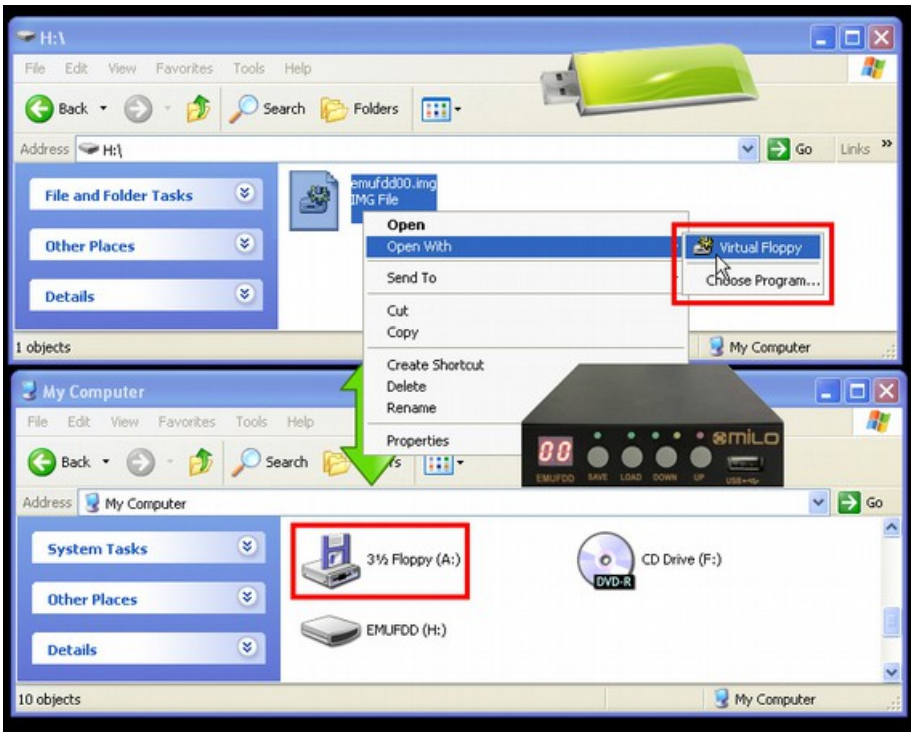
- are available for both loading and saving;
- are a low-level snapshot of the floppy disk surface;
- allow unlimited emulation of any floppy disk (system, bootable, custom, …);
- can be directly mounted as virtual floppy drives by free software VFD;
- can be directly imported as backups of real floppies by free software OmniFlop;
- can be enabled/disabled at anytime without reconfiguring (**SECTION 11**).



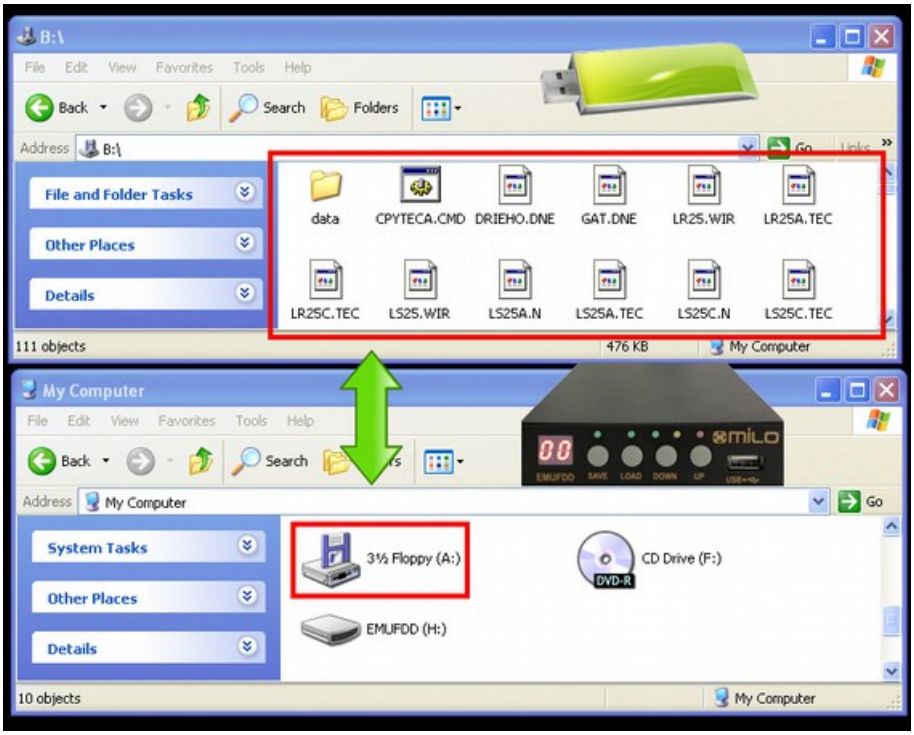
[*top window*] USB key (H:) in the PC server
[*bottom window*] EMUFDD (A:) in the machinery



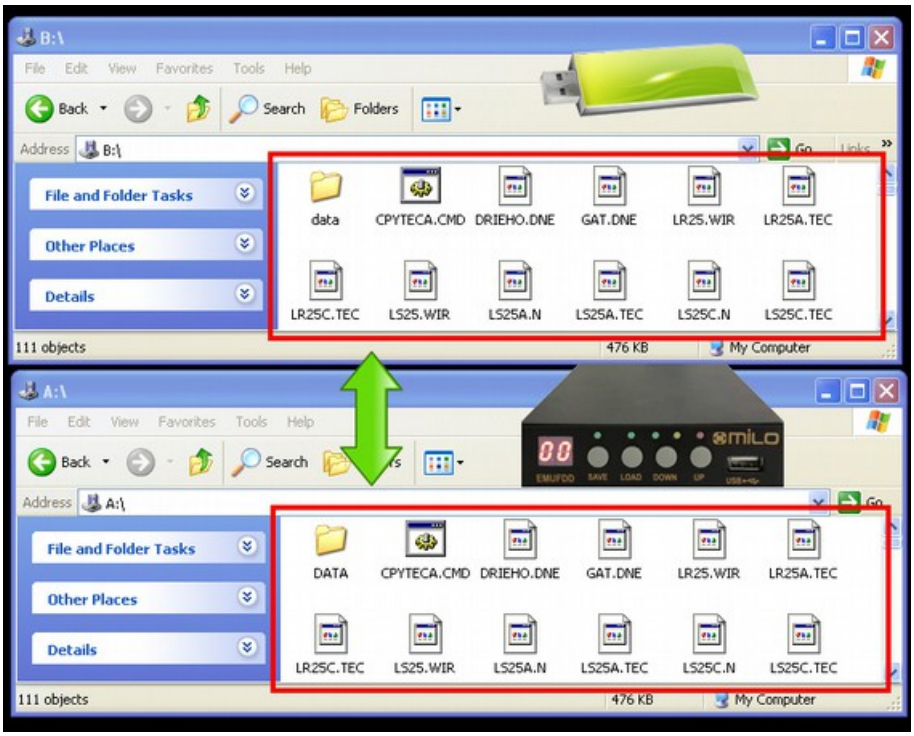
[*top window*] USB key (H:) in the PC server
[*bottom window*] EMUFDD (A:) in the machinery



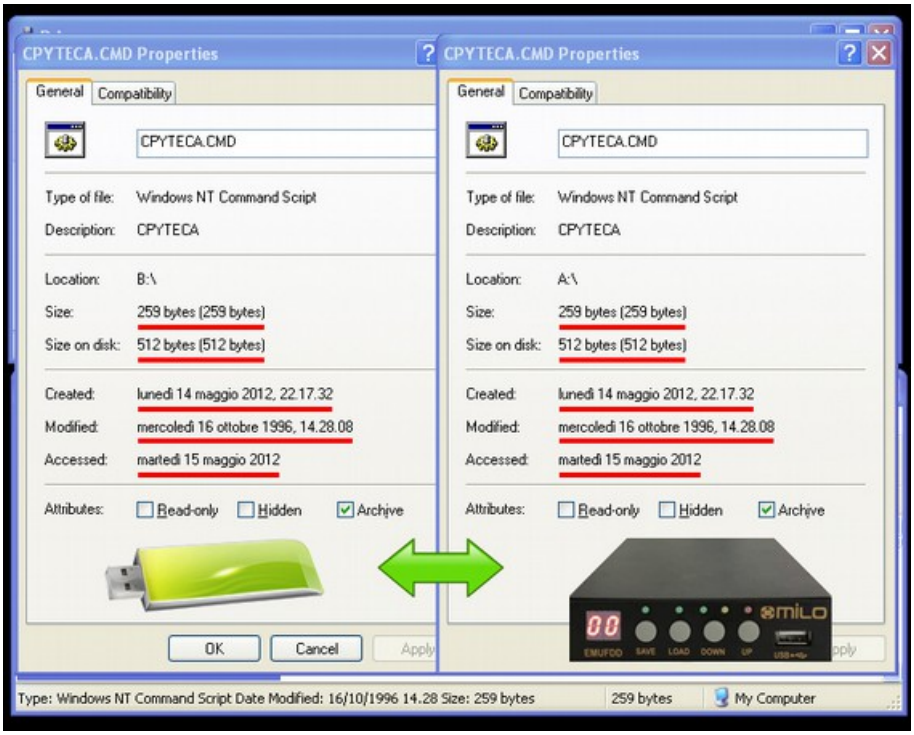
[*top window*] USB key (H:) in the PC server
[*bottom window*] EMUFDD (A:) in the machinery



[*top window*] USB key (H:) + VFD (B:) in the PC server
[*bottom window*] EMUFDD (A:) in the machinery



[*top window*] USB key (H:) + VFD (B:) in the PC server
[*bottom window*] EMUFDD (A:) in the machinery


CPYTECA.CMD Properties
General Compatibility
CPYTECA.CMD
Type of file: Windows NT Command Script
Description: CPYTECA
Location: B:\
Size: 259 bytes (259 bytes)
Size on disk: 512 bytes (512 bytes)
Created: lunedì 14 maggio 2012, 22.17.32
Modified: mercoledì 16 ottobre 1996, 14.28.08
Accessed: martedì 15 maggio 2012
Attributes: Read-only Hidden Archive
OK Cancel Apply
CPYTECA.CMD Properties
General Compatibility
CPYTECA.CMD
Type of file: Windows NT Command Script
Description: CPYTECA
Location: A:\
Size: 259 bytes (259 bytes)
Size on disk: 512 bytes (512 bytes)
Created: lunedì 14 maggio 2012, 22.17.32
Modified: mercoledì 16 ottobre 1996, 14.28.08
Accessed: martedì 15 maggio 2012
Attributes: Read-only Hidden Archive
Type: Windows NT Command Script Date Modified: 16/10/1996 14.28 Size: 259 bytes
259 bytes My Computer

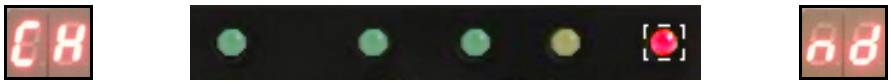
A diff between the original **disk#00** in the USB key (B:\cpyteca.cmd) and its "translated" version by EMUFDD (A:\cpyteca.cmd) shows that there's no high-level and low-level difference in the directory structure and the attributes of each file:

Name / Size / Size on disk / Creation time / Modify time / Access time

Section 6. LOADING INTO EMUFDD'S MEMORY FROM USB

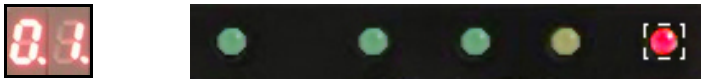
- 6.1) plug the USB key in and go Off-Line: press LOAD;

- 6.2) OFF-LINE_LED turns on and the display shows **[CH]** while *checking* the USB key for floppy image files (and subdirectories, if translation is on). Should *no USB device* be plugged in, the displays shows **[nd]** and EMUFDD switches automatically back to On-Line mode;



- 6.3) the display shows the current floppy number. Select the floppy to be loaded changing the current number (short DOWN/UP pressure = –1/+1, long DOWN/UP pressure = fast rewind/forward). Missing floppies are shown as **[NN]**, existing floppies are shown as **[N.N.]**.
  Only existing floppies can be loaded, pressing LOAD;

- 6.4) the display, while *loading*, shows **[LO]** and LOAD_LED / ACT_LED turn on, until loading end. Any loading *error* immediately stops loading and display shows **[Er]**. Successful loading ends with display showing again current floppy number and LOAD_LED / ACT_LED turned off;



- 6.5) being no button pressed, after 5 seconds, EMUFDD automatically switches back to On-Line mode. Feel free to plug the USB key safely off.

Plugging the USB key off while loading will not damage the USB key but will force EMUFDD to reset with an inconsistent internal memory !

Loading completely overwrites EMUFDD's internal memory.
The previous floppy, if not backed up before, can't be recovered !

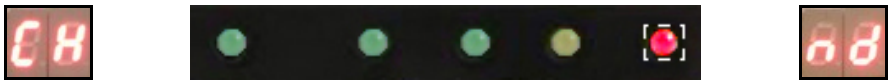
CLICK HERE FOR A VIDEO-DEMO: LOADING INTO INTERNAL MEMORY FROM USB

Load + Save can be used to create, without using a PC, multiple copies of an existing floppy on the USB key. For example: load NN and save it as NN+1, NN+2, NN+3, ...

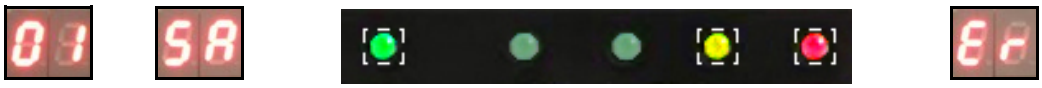
Section 7. SAVING FROM EMUFDD'S INTERNAL MEMORY TO USB

- 7.1) plug the USB key in and go Off-Line: press SAVE;

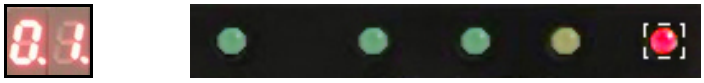
- 7.2) OFF-LINE_LED turns on and the display shows **[CH]** while *checking* the USB key for floppy image files (and subdirectories, if translation is on). Should *no USB device* be plugged in, the displays shows **[nd]** and EMUFDD switches automatically back to On-Line mode;



- 7.3) the display shows the current floppy number. Select the floppy to be saved changing the current number (short DOWN/UP pressure = –1/+1, long DOWN/UP pressure = fast rewind/forward). Missing floppies are shown as **[NN]**, existing floppyies are shown as **[N.N.]**.
Both missing and existing floppies can be saved, pressing SAVE (missing ones are created, existing ones are overwritten);



- 7.4) the display, while *saving*, shows **[SA]** and SAVE_LED / ACT_LED turn on, until saving end. Any saving *error* immediately stops saving and display shows **[Er]**. Successful saving ends with display showing again current floppy number and SAVE_LED / ACT_LED turned off;



- 7.5) being no button pressed, after 5 seconds, EMUFDD automatically switches back to On-Line mode. Feel free to plug the USB key safely off.

Plugging the USB key off while saving will damage the USB key. Plug the USB key off only after the OFF-LINE_LED (red) turns off !

Saving completely overwrites USB key's destination.
The previous floppy, if not backed up before, can't be recovered !

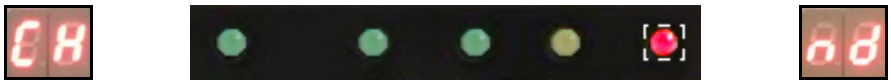
CLICK HERE FOR A VIDEO-DEMO: SAVING FROM INTERNAL MEMORY TO USB

Load + Save can be used to create, without using a PC, multiple copies of an existing floppy on the USB key. For example: load NN and save it as NN+1, NN+2, NN+3, ...

Section 8. FORMATTING EMUFDD'S INTERNAL MEMORY AND USB

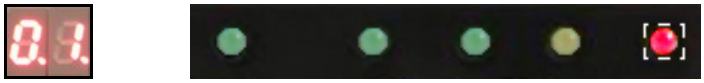
- 8.1) plug the USB key in and go Off-Line: press SAVE;

- 8.2) OFF-LINE_LED turns on and the display shows **[CH]** while *checking* the USB key for subdirectories (format is allowed only when translation is on). Should *no USB device* be plugged in, the displays shows **[nd]** and EMUFDD switches automatically back to On-Line mode;



- 8.3) the display shows the current floppy number. Select the floppy to be formatted changing the current number (short DOWN/UP pressure = –1/+1, long DOWN/UP pressure = fast rewind/forward). Missing floppies are shown as **[NN]**, existing floppyies are shown as **[N.N.]**.
Both missing and existing floppies can be formatted pressing SAVE+LOAD (missing ones are created, existing ones are overwritten);

- 8.4) the display, while *formatting*, shows **[FO]** and SAVE_LED / LOAD_LED / ACT_LED turn on, until formatting end. Any formatting *error* immediately stops formatting and display shows **[Er]**. Successful formatting ends with display showing again current floppy number and SAVE_LED / LOAD_LED / ACT_LED turned off;



- 8.5) being no button pressed, after 5 seconds, EMUFDD automatically switches back to On-Line mode. Feel free to plug the USB key safely off.

Plugging the USB key off while formatting will both damage the USB key and force EMUFDD to reset with an inconsistent internal memory. Plug the USB key off only after the OFF-LINE_LED (red) turns off !

Formatting completely overwrites USB key's destination.
The previous floppy, if not backed up before, can't be recovered !

Format is allowed only in softwareless mode (when translation is on) Check the supported formats (**SECTION 4**).

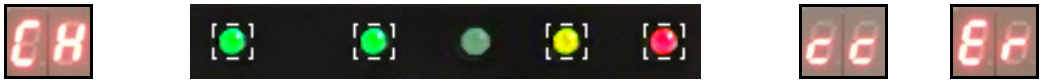
Section 9. LOADING A CONFIGURATION

EMUFDD configuration is plug'n'play and absolutely jumper-free. It's also possible to configure the emulator with up to 100 different configurations and switch, at run-time, between them. The first 10 configurations (c0÷c9) can be loaded with any custom setting, the other 90 configurations (0.0÷9.0) are fixed presets.

- 9.1) load a valid "**emufdd.cfg**" file into a USB key;

Configuration files for any machinery/floppy drive/floppy disk will be provided for free, only after purchasing, writing to the customer support (*EmbeddedSW, 7/7 direct line with the designer of EMUFDD*) *at* **embedded@embeddedsw.net**

- 9.2) plug the USB key in and go Off-Line: press LOAD;



- 9.3) the device will auto-reset (all leds blink very fast) and the display, while *changing configuration*, shows **[cc]**. Any configuration *error* immediately stops auto-reset and display shows **[Er]**;

- 9.4) load a valid floppy into memory (**SECTION 6**) or, if format is supported, format EMUFDD's memory (**SECTION 8**).

Section 10. SWITCHING CONFIGURATION

- 10.1) with no USB key plugged in press SAVE+DOWN+UP;

- 10.2) select the new configuration (NN = c0÷c9, 0.0÷9.0) changing the current number (DOWN/UP pressure = –1/+1). Missing configurations are shown as **[cN]**, existing configurations are shown as **[c.N]** and **[N.N]**.
  Only existing configurations can be loaded, pressing SAVE+LOAD;

- 10.3) the device will auto-reset (all leds blink very fast) and the display, while *changing configuration*, shows **[cc]**;

- 10.4) load a valid floppy into memory (SECTION 6) or, if format is supported, format EMUFDD's memory (SECTION 8).

Example 1: Your device needs two (*or more*) *different kinds of floppy disks. Base configuration* (**c0**) *is assigned to the boot disk, the following ones* (**c1**/**c2**/...) *are assigned to user programs with different formats* (720 KB, 800 KB, 1.440 MB, ...).

- device is powered up;
- user selects base configuration and loads the boot image;
- user selects another configuration and loads/saves user programs.

c0 (BOOT) **c1** (720 KB) **c2** (800 KB)

Example 2: You own more different devices and need to use the floppy on only one of them at a time. Each device is assigned a configuration and you buy only 1 EMUFDD.

- EMUFDD is connected “on the fly” to device-**i**;
- user selects configuration-**i** and loads/saves a batch of work;
- EMUFDD is disconnected from device-**i** and user goes on to the next one.

c0 (DEVICE-0) **c1** (DEVICE-1) **cN** (DEVICE-N)

Connecting an EMUFDD “on-the-fly” it's very easy. You only need to modify, on each machinery, the floppy flat and power supply cables with longer ones, coming out from the machinery/control. After this modify, connecting/disconnecting the EMUFDD will be as easy as connecting/disconnecting a USB key and fast, since there's no more need to open the machinery to reach the floppy cables.

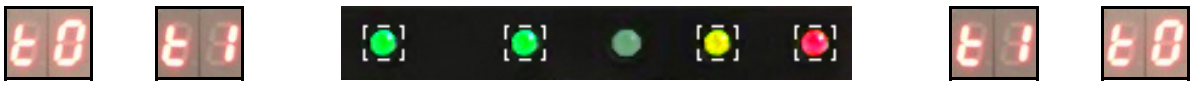
Here's an example flowchart about a plastic-injection company with three different kinds of machinery, using a single “shared” EMUFDD device.

MACHINERY 1 MACHINERY 2 MACHINERY 3

Section 11. SOFTWARELESS MODE ON/OFF

The softwareless mode translation feature (SECTION 4) can be enabled/disabled at anytime without reconfiguring the device.

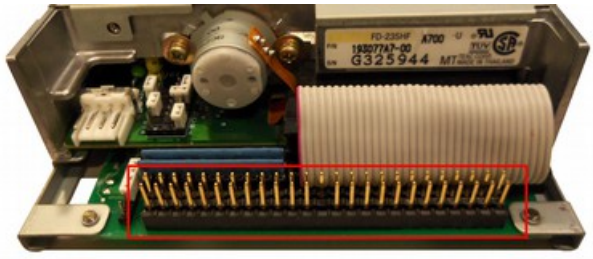
- 11.1) with no USB key plugged in press SAVE+UP;
- 11.2) the current translation configuration is shown as **[tN]** (N = 0/1 = disabled/enabled). Pressing SAVE+UP again causes the translation configuration to switch;



- 11.3) the device will auto-reset (all leds blink very fast) and the display shows the new *translation* configuration **[tN].**

Appendix A. SUPPORTED FLOPPY DISK DRIVE INTERFACES

34pin 3.5" floppy: ***Supported***



50pin SCSI floppy: ***Supported***

26pin floppy: ***Supported***

26pin slim floppy: ***Supported***

5.25" & 8" floppy: ***Supported***

USB 1.0 floppy: ***Supported***

The bullet-proof EMUFDD emulation is available on all the known floppy disk drive interfaces, from the oldest ones to the most modern ones. Supported interfaces are emulated with a wide portfolio of solutions: (1) being natively supported; (2) using custom adapters manufactured by us; (3) using industry-strenght standard adapters.